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APPLICATION FOR U. S. LETTERS PATENT

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ENTITLED

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**SYSTEM AND STRUCTURE COMPRISING INTEGRATED VEHICLE LIFT
SYSTEM**

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BY

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44 **TITLE OF THE INVENTION:** System and Structure Comprising Integrated Vehicle
46 Lift System

48 **PRIORITY DATE CLAIMED:** None.

50 **BACKGROUND OF THE INVENTION**

52 **1. FIELD OF THE INVENTION**

54 The field of the invention relates to a new improvement in an automobile by
incorporating a pneumatic jack structure at each corner of the lower frame, and more
56 particularly pertains to a new and improved vehicle wherein the same employs four
stacked pneumatic flexible chambers, each positioned within a housing attached to a
58 point on the perimeter of the structural frame of the vehicle to permit a jack to effect
lifting of a corner of the automobile.

60 **2. DESCRIPTION OF THE PRIOR ART**

In 1995, Sweeney was issued U. S. Patent 5,441,237 for an external pneumatic lift
62 jack powered by a cigarette socket connection to an automobile. Sweeney is limited in
its scope to a pneumatic jack structure, and more particularly pertains to a pneumatic
64 vehicle jack wherein the same employs stacked pneumatic flexible chambers positioned
within a housing permitting the housing to effect lifting of an associated vehicle by
66 manually placing the jack and housing underneath the vehicle. This structure is an
example of a non-integrated external means for lifting one corner of an automobile and is
68 incorporated into this specification by reference.

Other pneumatic jack structures of various types have been employed in the prior
70 art as exemplified by the U.S. Patents 4,542,882; 5,121,900; 5,184,930; 3,993,286; and
5,232,206. The jack structures of the prior art have heretofore been non-integrated
72 structures as in the manner of U.S. Pat. No. 4,542,882 which teaches a non-integral bag
arranged to receive pressurized air from an exhaust system into a single flexible bag
74 structure.

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OBJECTS OF THE INVENTION

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80 It is accordingly a primary object of this invention to provide a lift system
that is integrated into the supporting frame of an automobile as a displacement for all
82 types of separate trunk-stored conventional hydraulic, scissors, and ratcheting jacks.

It is an object of the present invention to provide a combination of an automobile
84 and an integrated lift system capable of lifting and supporting the automobile above each
of its four wheels.

86 It is an object of the present invention to provide an integrated four point
automobile lift system which is unparalleled in safety, eliminating the risk of lifting an
88 automobile with a jack that can be expelled from underneath the automobile.

It is an object of the invention to provide an improvement in automobile lift
90 structures capable of lifting a plurality of the wheels supporting the automobile.

Heretofore, various approaches have been devised to address the need in the
92 marketplace for a means to easily solve the problem of fixing a flat tire in a neat efficient
way. To this end, tires have been improved to incorporate means for resisting puncture
94 such as by employing steel belting, means for self-sealing a puncture such as by
incorporating a resin coating on the inside surface of a tire which mends itself when air
96 exits at a puncture point, and more recently with a combination of a means for jacking the
vehicle at the flattened wheel using a trunk housed pneumatic jack powered by a plug
98 inserted into a cigarette lighter socket and a trunk housed pneumatic lug wrench also
powered by a car battery accessed via the cigarette lighter. In the latter scenario,
100 valuable trunk cargo space similar to that used to house prior generation CD players is
taken up by the trunk stored pneumatic jack. Moreover, in the circumstance of dual flat

102 times, the jack must be set up at one point underneath the automobile and then at a
second point for the second flat tire. It is thus a primary object of the invention to
104 eliminate the need to use trunk space to store a pneumatic jack and to provide a means
for selectively automatically pneumatically lifting all four corners of a vehicle for
106 changing tires, rotating tires, and for periodic home safety inspections of the components
of the vehicle viewable from underneath.

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SUMMARY OF THE INVENTION

The novel structure of the present invention is a combination of a four
112 wheeled automobile having a support frame supported by four inflatable tires and four
integral pneumatic jacks attached to and integrated into each of four corners of the
114 support frame to selectively lift each of the four corners of the automobile. Each of the
integral pneumatic jacks is separately electrically powered using a 12 volt DC source
116 such as a car battery.

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BRIEF DESCRIPTION OF THE DRAWINGS

120 These and other features, aspects, and advantages of the present invention will
become better understood with regard to the following description, appended claims, and
122 accompanying drawings wherein:

FIG. 1 is a right side view of the invention integrated into a right structural
124 lowermost support frame part of an associated automobile.

FIG. 2 is a left side view of the invention integrated into the left structural
126 lowermost support frame part of the associated automobile.

FIG. 3a is a graphic side view of one of the pneumatic lifts showing a connection
128 to a pneumatic pump.

FIG. 3b is an orthographic plan view of one of the pneumatic lifts, taken along the
130 lines 3b-3b' of FIG. 3a in the direction indicated by the arrows.

Fig. 3c is a circuit diagram for a central dashboard control panel of switches
132 connecting a car battery or an equivalent to each of four pneumatic pumps.

FIG. 4 is an orthographic view, taken along the lines 4-4' of FIG. 3b in the
134 direction indicated by the arrows.

FIG. 5 is an enlarged orthographic view of a structure 500 as shown in FIG. 4.

136 FIG. 6 is an orthographic view of a plurality of supporting plate tubes employed
by the invention.

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140 **DESCRIPTION OF THE PREFERRED EMBODIMENT**

142 The present invention will be described hereinafter with reference to the
accompanying drawings, which illustrate a preferred embodiment of the invention.
144 As required, a detailed embodiment of the present invention is disclosed herein; however,
it is to be understood that the disclosed embodiment is merely exemplary of the
146 invention, which may be embodied in various forms. Therefore, specific structural and
functional details disclosed herein are not to be interpreted as limiting, but merely as a
148 basis for the claims and as a representative basis for teaching one skilled in the art to
variously employ the present invention in virtually any appropriately detailed structure.

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The combination invention of an improved automobile incorporates a plurality of
152 pneumatic jacks, one for each wheel of the automobile or vehicle, such as the pneumatic
vehicle jacks 10 and 12 on the right side of a vehicle 13 as indicated in FIG. 1 and the
154 pneumatic jacks 14 and 16 as indicated in FIG. 2 on the left side of the vehicle 13. Each
of the jacks 10, 12, 14, and 16 has connected thereto an associated interconnection box
156 100, 120, 140, and 160, respectively. Each of the jacks 10, 12, 14, and 16 is permanently
affixed underneath the vehicle 13 by welding to a structural frame 20. Each of the jacks

158 10,12, 14, and 16 is arranged for extension to a supporting surface 22. Each of the jacks
10,12, 14, and 16 is adapted and designed to extend to the surface 22 below the vehicle
160 13, such that upon actuation of any one of the jacks 10,12, 14, and 16 the vehicle 13 is
lifted above the surface 22 permitting access below the vehicle and to various activities
162 such as tire changing and the like.

164 In Fig. 3a there is shown in detail one of the replicated jacks 10,12, 14, and 16,
namely the jack 10. The jack 10 has a rigid housing 11. With a cylindrical sidewall, the
166 jack 10 has a continuous pneumatic cylinder 32 with a cylindrical sidewall, a bottom
wall 33, and a top wall 31 made of steel and welded to the frame 20 (as shown in Figs. 1
168 and 2). Orthogonally mounted to the bottom wall 33 is a support tube 34 employing
gussets 35 to insure rigidity of the jack 10 when in use. A ground or surface support
170 plate 36 adapted to make contact with the surface 22 (shown in Figs. 1 and 2) is provided.
The support plate 36 may be of a general surface size and configuration for supporting
172 the weight of the vehicle 13.

There is also shown in Figs. 1 and 2 an integrated electrical control and switching
174 module 18 mountable and/or integratable on a dashboard or otherwise inside a cockpit of
an automobile. The module 18 has an electrical terminal 62 comprising positive and
176 negative terminals 62a and 62b adapted to receive the mating terminals 62a and 62b
(shown in Fig. 3c) extending from the interconnection box 100. The module 18 connects
178 to a car battery 164 and/or the electrical output of the automobile.

Shown in Fig. 3c is a diagram of the circuitry for the module 18, further showing
180 the terminal 63 comprising positive and negative terminals 63a and 63b adapted to
receive the mating terminals 63a and 63b that extend from the interconnection box 120.
182 Also illustrated in Fig. 3c is the terminal 64 comprising positive and negative terminals
64a and 64b adapted to receive the mating terminals 64a and 64b of connector 64 that
184 extend from the interconnection box 140. The terminal 65 comprises positive and
negative terminals 65a and 65b adapted to receive the mating terminals 65a and 65b of
186 connector 65 that extend from the interconnection box 160.

The preferred geometry for the support plate 35 is approximately round or oblong
188 and the size should be at least 100 square centimeters for a vehicle 13 weighing about

2000 pounds to be lifted with one or more jacks on a composite asphalt surface 22.

190 As further shown in Fig. 3a, the support plate 36 for each jack is fixedly and
orthogonally secured to a plate tube 37. And, as shown in greater detail in FIG. 4, the
192 support plate 36 is permanently affixed or welded to the plate tube 37, which is
threadedly received within the support tube 34.

194 First and second internally connected pneumatic cylinders 44 and 45 are
telescopically connected cylindrical sidewalls wherein the outer side of the cylinder 44 is
196 telescopically connected to the sidewall of the cylinder 32 as illustrated in FIG. 4.

Internally, a plenum 48 contains a vertical return spring 49 connecting the
198 cylinder 32 to the cylinder 45. The spring 49 retracts the cylinders 32 and 44 as the
plenum 48 is emptied via a tube 50.

200 In the unexpanded position shown in Figs. 1, 2, and 3, the pneumatic cylinders 44
and 45 are positioned within the jack 10. Shown in Fig. 4, upon pumping of fluid or gas
202 to the plenum 48 via the entry high pressure reinforced flexible tube 50, the plenum 48
expands telescopically extending the cylinders 44 and 45 as well as the bottom wall 33 of
204 the cylinder 32. As the plate 36 presses the surface 22, the vehicle 13 is lifted.

A pneumatic compressor 52 is provided with a pneumatic conduit 54. The
206 conduit 54, a high pressure reinforced flexible tube, extends from the pneumatic
compressor 52 to a valve assembly 56 that directs pneumatic pressurized air to the first
208 and second pneumatic cylinders 44 and 45 as well as to the cylinder 32 through the tube
50 (see FIG. 5). A two wire electrical DC power supply cord 62 extends between a 12
210 volt battery 164 via an electrical switch 66 and the pneumatic compressor 52.

212 In Fig. 5 there is shown a check valve 500 connected to the tube 50. The valve
500 has a check valve plate 529 pivotally mounted within the valve assembly's conduit
214 521a. To prevent pressurized air from being directed from the plenum 48 back through
the valve assembly 521 to the pneumatic tube 50 is a plate abutment 530 positioned
216 within the valve assembly conduit 521a between the plate 529 and the pneumatic tube 50.
In this manner, pressurized air from the plenum 48 engages the plate 529 preventing such
218 pressurized air from exiting. To permit release of air from the plenum 48, a rotary release
shaft 532 is provided and positioned between the plate 529 and the pneumatic tube 50

220 such that the rotary release shaft 532 is spaced a predetermined length from the plate 529.
A shaft foot 531 is fixedly and orthogonally mounted to the release shaft 532, having a
222 foot length greater than the predetermined length such that upon rotation of the release
shaft 532, the shaft foot 531 engages the plate 529 and displaces the plate relative to the
224 abutment 530, such as indicated in phantom in FIG. 5, to permit pressurized air to be
released from the plenum 48 through the conduit 521a for ultimate release through a
226 relief opening 52a within the compressor 52.

228 Fig. 6 shows in further detail the use of the support tube 34 having aligned tube
bores 633 to receive a lock pin 632, that in turn is received through replacement plate
230 support tubes defined by a first, second, and third plate tube 634, 635, and 636
respectively, with the first plate tube 634 having a first length, the second plate tube 635
232 having a second length less than the first length, and the third plate tube 636 having a
third length less than the second length to provide for selective adjustment and
234 substitution to accommodation of vehicles of varying ground clearance, with each of the
plate tubes 634, 635, and 636 having respective aligned bores 637 for selective mounting
236 within the support tube 34 in lieu of the primary plate tube 37 (shown in Fig. 4) that is
threadedly received within the support tube 34.

238 It is to be understood that while certain forms of the present invention have been
illustrated and described herein, it is not to be limited to the specific forms or
240 arrangement of parts described and shown.

The foregoing is considered as illustrative only of the principles of the invention.
242 Further, since numerous modifications and changes will readily occur to those skilled in
the art, it is not desired to limit the invention to the exact construction and operation
244 shown and described, and accordingly all suitable modifications and equivalents may be
resorted to, falling within the scope of the invention.

246 As this invention may be embodied in several forms and utilize each of many
kinds of lifting and/or jacking systems without departing from the spirit or essential
248 characteristics thereof, the present embodiment shown is, therefore, illustrative and not
restrictive, since the scope of the invention is defined by the appended claims and the
250 doctrine of equivalents rather than by the description preceding them, and all changes

that fall within the metes and bounds of the claims or that form their functional as well as
252 conjointly cooperative equivalent steps are, therefore, intended to be embraced by those
claims.

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| | | |
|-----|------------------------------|--------------------------|
| 254 | | <u>PARTS LIST</u> |
| | pneumatic vehicle jack | 10 |
| 256 | housing | 11 |
| | pneumatic vehicle jack | 12 |
| 258 | vehicle | 13 |
| | pneumatic jack | 14 |
| 260 | pneumatic jack | 16 |
| | interconnection box | 100 |
| 262 | interconnection box | 120 |
| | interconnection box | 140 |
| 264 | interconnection box | 160 |
| | structural frame | 20 |
| 266 | supporting surface | 22 |
| | cylinder | 32 |
| 268 | bottom wall | 33 |
| | top wall | 31 |
| 270 | support tube | 34 |
| | gusset | 35 |
| 272 | plate | 36 |
| | spring | 49 |
| 274 | control and switching module | 18 |
| | outlet tube | 60 |
| 276 | terminal | 62 |
| | terminal | 62a |
| 278 | terminal | 62b |
| | battery | 164 |
| 280 | terminal | 63 |
| | terminal | 63a |
| 282 | terminal | 63b |
| | terminal | 64 |
| 284 | terminal | 64a |

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|-----|--------------------|------|
| | terminal | 64b |
| 286 | connector | 64 |
| | switch | 65 |
| 288 | terminal | 65a |
| | terminal | 65b |
| 290 | plate tube | 37 |
| | support tube | 34 |
| 292 | pneumatic cylinder | 44 |
| | pneumatic cylinder | 45 |
| 294 | plenum | 48 |
| | tube | 50 |
| 296 | compressor | 52 |
| | opening | 52a |
| 298 | conduit | 54 |
| | valve assembly | 56 |
| 300 | electrical switch | 66 |
| | check valve | 500 |
| 302 | check valve plate | 529 |
| | conduit | 521a |
| 304 | valve assembly | 521 |
| | plate abutment | 530 |
| 306 | shaft foot | 531 |
| | release shaft | 532 |
| 308 | tube bores | 633 |
| | lock pin | 632 |
| 310 | first plate tube | 634 |

| | | |
|-----|-------------------|-----|
| | second plate tube | 635 |
| 312 | third plate tube | 636 |
| | aligned bores | 637 |
| 314 | | |